

WHAT IS CLAIMED IS:

1. A Web service coordination plan creating apparatus, comprising:

5 a first storage section which stores user data that makes predicates indicating a states of a user;  
a second storage section which stores a database that associates preconditions representing, in predicate form, necessary conditions for users to use Web services via an information communication network,  
10 with post conditions representing, in predicate form, the effects of invocation of the corresponding Web services; and

coordination plan creating means for, when receiving a user's request including search conditions  
15 for the Web services, acquiring matching user data in predicate form corresponding to the user's request from the first storage section, acquiring from the second storage a combination of Web services which satisfies the user's request by logically combining the  
20 preconditions and post conditions for a plurality of Web services including a Web service having the preconditions matching with the user data and a Web service having the post conditions matching with the user data, and creating a Web service linking plan  
25 where the individual Web services included in the combination are arranged in the order of the logical combination.

2. The Web service coordination plan creating apparatus according to claim 1, wherein

the coordination plan creating means carries out  
a first process of matching the predicate of the  
5 precondition with the predicate of the user data and  
matching the predicate of the post condition with the  
predicate of the user's request in respect to one Web  
service, and

a second process of matching the predicate of the  
10 precondition with a first predicate including the  
predicate of the user data unmatched in the first  
process and matching the predicate of the post  
condition with a second predicate including the  
predicate of the user's request unmatched in the first  
15 process in respect to other Web services excluding the  
one Web service.

3. The Web service coordination plan creating apparatus according to claim 2, wherein

the coordination plan creating means carries out  
20 the second process by calling the first process  
recursively.

4. The Web service coordination plan creating apparatus according to claim 1, wherein

the coordination plan creating means carries out  
25 a first process of matching the predicate of the  
precondition with the predicate of the user data and  
matching the predicate of the post condition with

the predicate of the user's request in respect to one Web service, and

5 a third process of matching the predicate of the post condition with a third predicate including the predicate of the user's request unmatched in the first process in respect to other Web services excluding the one Web service.

5. The Web service coordination plan creating apparatus according to claim 4, wherein  
10 the coordination plan creating means carries out the third process by calling the first process recursively.

6. The Web service coordination plan creating apparatus according to claim 1, further comprising:  
15 a third storage section which stores an ontology dictionary where a plurality of predicates describing each state by predicate logic notation are classified hierarchically in database form, wherein  
the coordination plan creating means creates  
20 matching user data by changing the predicate included in the user's request according to a hierarchical level in the ontology dictionary.

7. A Web service coordination plan creating method which uses user data that makes predicates  
25 indicating the states of users and a database that associates preconditions representing, in predicate form, necessary conditions for users to use Web

services via an information communication network, with  
post conditions representing, in predicate form, the  
result of receiving the Web services to correspond to  
the Web services, the Web service linking plan method  
5 comprising:

a first step of, when receiving a user's request  
including search conditions for the Web services,  
acquiring matching user data in predicate form  
corresponding to the user's request from a first  
10 storage section;

a second step of acquiring from the second storage  
a combination of Web services which satisfies the  
user's request by logically combining the preconditions  
and post conditions for a plurality of Web services  
15 including a Web service having the preconditions  
matching with the user data and a Web service having  
the post conditions matching with the user data; and

a third step of creating a Web service linking  
plan where the individual Web services included in the  
combination acquired in the second step are arranged in  
20 the order of the logical combination.

8. The Web service coordination plan creating  
method according to claim 7, wherein

the second step includes  
25 a fourth step of matching the predicate of the  
precondition with the predicate of the user data and  
matching the predicate of the post condition with the

predicate of the user's request in respect to one Web service, and

5       a fifth step of matching the predicate of the precondition with a first predicate including the predicate of the user data unmatched in the fourth step and matching the predicate of the post condition with a second predicate including the predicate of the user's request unmatched in the fourth step in respect to other Web services excluding the one Web service.

10       9. The Web service coordination plan creating method according to claim 8, wherein

the second step is a step of carrying out the fifth step by calling the fourth step recursively.

15       10. The Web service coordination plan creating method according to claim 7, wherein

the second step includes

20       a sixth step of matching the predicate of the precondition with the predicate of the user data and matching the predicate of the post condition with the predicate of the user's request in respect to one Web service, and

25       a seventh step of matching the predicate of the post condition with a third predicate including the predicate of the user's request unmatched in the sixth step in respect to other Web services excluding the one Web service.

11. The Web service coordination plan creating

method according to claim 10, wherein

the second step is a step of carrying out the seventh step by calling the sixth step recursively.

12. The Web service coordination plan creating  
5 method according to claim 7, further comprising:

using an ontology dictionary where a plurality of predicates describing each state by predicate logic notation are classified hierarchically in database form, wherein

10 the first step is a step of creating matching user data by changing the predicate included in the user's request according to a hierarchical level in the ontology dictionary.

13. A recording medium which records a program for  
15 causing a computer to carry out a Web service coordination plan creating method which uses user data that makes predicates indicating the states of users and a database that associates preconditions representing, in predicate form, necessary conditions  
20 for users to use Web services via an information communication network, with post conditions representing, in predicate form, the result of receiving the Web services to correspond to the Web services, the program comprising:

25 a first instruction which causes the computer to execute a first step of, when receiving a user's request including search conditions for the Web

services, acquiring matching user data in predicate form corresponding to the user's request from a first storage section;

5       a second instruction which causes the computer to execute a second step of acquiring from the second storage a combination of Web services which satisfies the user's request by logically combining the preconditions and post conditions for a plurality of Web services including a Web service having the  
10       preconditions matching with the user data and a Web service having the post conditions matching with the user data; and

      a third instruction which causes the computer to execute a third step of creating a Web service linking  
15       plan where the individual Web services included in the combination acquired in the second step are arranged in the order of the logical combination.

14. The recording medium according to claim 13, wherein

20       the second instruction includes

      a fourth instruction which causes the computer to execute a fourth step of matching the predicate of the precondition with the predicate of the user data and matching the predicate of the post condition with the  
25       predicate of the user's request in respect to one Web service, and

      a fifth instruction which causes the computer to

execute a fifth step of matching the predicate of the precondition with a first predicate including the predicate of the user data unmatched in the fourth step and matching the predicate of the post condition with a  
5 second predicate including the predicate of the user's request unmatched in the fourth step in respect to other Web services excluding the one Web service.

15. The recording medium according to claim 14, wherein  
10 the second step is a step of carrying out the fifth step by calling the fourth step recursively.

16. The recording medium according to claim 13, wherein  
the second instruction includes  
15 a sixth instruction which causes the computer to execute a sixth step of matching the predicate of the precondition with the predicate of the user data and matching the predicate of the post condition with the predicate of the user's request in respect to one Web  
20 service, and

a seventh instruction which causes the computer to execute a seventh step of matching the predicate of the post condition with a third predicate including the predicate of the user's request unmatched in the sixth  
25 step in respect to other Web services excluding the one Web service.

17. The recording medium according to claim 16,



wherein

the second step is a step of carrying out the seventh step by calling the sixth step recursively.

18. The recording medium according to claim 13,  
5 further comprising:

using an ontology dictionary where a plurality of predicates describing each state by predicate logic notation are classified hierarchically in database form, wherein

10 the first step is a step of creating matching user data by changing the predicate included in the user's request according to a hierarchical level in the ontology dictionary.